

CHAPTER 2

WATER TREATMENT SYSTEMS

2-1. General design criteria.

a. Water treatment plants. Water treatment plants at mobilization facilities must produce water of sufficient quality and quantity for all intended purposes. If the water is to be used for human consumption, it must be free of organisms or substances posing health hazards at all times. The overall water quality objective can be met if the water delivered to service meets the drinking water standards presented in TB MED 576. Typical design examples can be found in appendix A.

b. Water storage and distribution. The quality of water obtained at the user's tap is not determined solely by water treatment operations. Raw water quality and conditions in treated water storage and water distribution systems also affect the quality of tap water. Consequently, protection of raw water quality and finished water storage and delivery systems to the maximum practicable extent is essential. Excellence in water treatment is partially nullified unless other water system components are adequately designed, maintained, and operated. General considerations on water supplies can be found in EM 1110-3-160. Information on water sources is contained in EM 1110-3-161; on water storage in EM 1110-3-163; and on water distribution in EM 1110-3-164.

2-2. Plant siting. The following items will be considered in choosing a plant site.

- Proximity to the source of raw water.
- Proximity to the area to be served.
- Ability to locate intake upstream of wastewater discharges.
- Land availability and costs.
- Potential for flooding of the site.
- Availability and reliability of electric power.
- Geology and topography of the site.
- Availability of transportation facilities.
- Legal obligations or restrictions.

2-3. Process selection and design. The selection and design of the water treatment processes to be used at a particular facility are dictated by practicability, reliability, flexibility, and overall economics. Engineers experienced in water treatment plant design are needed to determine the best treatment system for any particular situation, and their advice should be obtained in the early stages of project planning. Detailed information about major treatment processes is given in chapter 3.

2-4. Reliability.

a. Duplicates of essential items, including pumps, settling basins, flocculators, filters, and chemical feeders should be provided as appropriate to allow periodic maintenance and repair. The degree of importance of each item must be evaluated on a case-by-case basis, considering that safe water has to be supplied at all times. One train of essential items may be constructed initially if this would allow the facility to be operational within the allotted mobilization time. Backup units can be constructed subsequently.

b. Installation of emergency generating facilities at the water treatment plant will be required if lengthy power outages are probable. Likewise, if the delivery of crucial chemical supplies is uncertain, larger than normal stores of these chemicals must be kept on hand, which would necessitate larger than normal chemical storage areas.

2-5. Operating considerations. To simplify plant operations, the following guidelines should be observed during the design stage.

a. Eliminate any unnecessary equipment and operations.

b. Locate operations requiring frequent operator attention reasonably close together. Filters, flocculators, and chemical feeding equipment generally require the most attention.

c. Simplify chemical handling and feeding as much as possible. Unloading and storage areas for chemicals should be easily maintained, readily accessible, and close to the point of application of chemicals.

d. Design flexibility into plants treating surface water to handle raw water quality changes.

2-6. Plant capacity. The water treatment plant will be sized to treat sufficient water to meet the requirements given in EM 1110-3-160. Care should be taken not to underestimate special water demands.